Thesis/
Reports
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Conservation Strategy Northern Rattlesnake-Plantain (Goodyera Repens) Lewis and Clark National Forest

September 1995

By H. W. Phillips et al.

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CONSERVATION STRATEGY

NORTHERN RATTLESNAKE-PLANTAIN (GOODYERA REPENS)

LEWIS AND CLARK NATIONAL FOREST

September 1995

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CONSERVATION STRATEGY
NORTHERN RATTLESNAKE-PLANTAIN (GOODYERA REPENS)
LEWIS AND CLARK NATIONAL FOREST
September 1995

I. BIOLOGICAL AND GEOGRAPHICAL INFORMATION

SCIENTIFIC NAME: GOODYERA REPENS (L.) R. Br.

COMMON NAME: northern rattlesnake-plantain

FAMILY: Orchidaceae (Orchid Family)

SYNONYMS: SATYRIUM REPENS L. Sp. Pl., EPIPACTIS REPENS Crantz, PERAMIUM REPENS Salisb., GOODYERA PUBESCENS V. REPENS, Wood, ORCHIODES REPENS Kuntze, GOODYERA OPHIODES Rydb., GOODYERA REPENS V. OPHIODES Fern.

USFS REGION 1 STATUS: Sensitive.

USFWS STATUS: None.

MONTANA STATUS: Sensitive

GLOBAL AND STATE RANK: The Montana Natural Heritage Program ranks this species as G5/S2S3, which means that the species is considered secure globally, but either very rare and local throughout its range, or found locally (even abundantly at some of its locations) in a restricted range, or vulnerable to extirpation because of other factors (Achuff, 1992).

GLOBAL DISTRIBUTION: Circumpolar; Alas. and Yuk. to Newf., s. to B.C., in the Rocky mts to N.M, also to S.D. and to n.c. U.S., Tenn., and N.C., also Eurasia.

MONTANA COUNTIES: Judith Basin, Wheatland, Fergus, Flathead

PHYSIOGRAPHIC DISTRIBUTION: Little Belt Mountains, mostly in Judith and Musselshell River drainages but also with minor occurrences in the following: Dry Fork Belt Creek of the Little Belts, Big Snowy Mtns. and North Fork of the Flathead drainage in Glacier National Park.

NATIONAL FOREST(S): Known only from Lewis and Clark National Forest; suspected on Flathead N.F.

HABITAT: Cool, moist to somewhat dry woods, in deep feathermosses on northerly aspects in spruce and subalpine fir/ twinflower,. Spruce/ninebark and subalpine fir/ sweet-scented bedstraw habitat types. Plants are rooted in the organic surface layers of these older forest stands. Normally found on limestone bedrock, but is also known to occur on sandstone, shale and (rarely) on igneous bedrock.

Associated mosses include: *Pleurozium schreberi*, *Drepanocladus uncinatus* and *Hyloconium splendens*. Associated herbaceous plants include: *Linnaea borealis* and *Pyrola* species. Elevation range is from 4400 to 6800 ft. elevation.

DESCRIPTION: This rhizomatous orchid grows from 1-1.5 dm (4-6 in) tall. The plant has glandular hairs. The leaves are basal with a broad, wing-margined petiole. Leaves are dark

green, ovate or heart-shaped to spear-shaped, and often have a white patterning along the veins and are 1.5-3 (.6-1.2 in) long. Leaves are often mottled, but without the distinct white mid-vein of the closely related Western rattlesnake-plantain, which sometimes co-occurs. The inflorescence is a raceme at the end of a naked stem. The white or pale-greenish orchid flowers are one side of the stem and close together. Hood is less than 5mm long. Lip is deeply saccate.

BLOOMING AND POLLINATION: In Montana flowering usually occurs in August, but may extend from late July to early September. The flowering stems are 4-8 inches tall with a terminal spike of small white flowers that are pollinated by insects, usually bumblebees.

SIMILAR SPECIES: *Goodyera oblongifolia*, western rattlesnake-plantain, is similar, but larger (10 to 18 inches tall), and has a distinct white mid-vein down the center of the leaf. Hood is 5mm or more long. Western rattlesnake-plantain is one of Montana's most common orchid species. (Achuff and Schassberger, 1991).

KNOWN OCCURENCES: There are 35 known populations of northern rattlesnake-plantain in Montana, with 34 of these located on the Lewis and Clark National Forest in the eastern Little Belt Mountains and the Big Snowy Mountains. These 34 populations are distributed over about 2,400 acres including an estimated 82,000 individual plants or stems. Population size varies from a few individuals on less than an acre to 17,000 individual stems on 450 acres on the largest population in Bear Gulch in the Little Belt Mountains.

NATURAL AND HUMAN LAND USE THREATS: Northern rattlesnake-plantain is vulnerable to surface disturbance that removes the shade and organic layer of the forest floor. It is a late successional forest species, dependent on the micro-climatic conditions of old growth or late successional forests. Stand replacement fires, either natural or prescribed, and timber harvest by clear-cutting or seed tree harvest methods have been observed to remove or greatly reduce this species within the treated stands.

One occurrence (EO 012) on Woodhurst Mountain may have been eliminated by the Turkey Fire in 1990. Further surveys are needed to confirm this. Two other occurrences, in Sage Creek (EO 007) and Sandpoint Creek (EO 001) have been greatly reduced by wildfire. The Sandpoint Creek population, in the Lost Fork Judith drainage, consists of a small island of occupied suitable habitat in an area skipped by the Sandpoint Fire of 1985. Large areas of suitable habitat were likely occupied before the fire and eliminated by this large, severe stand replacement wildfire. Observations on both of these wildfires show that these severe stand replacement wildfires remove the shade, the organic layers of the forest floor and the shade tolerant species that are associated with northern rattlesnake-plantain.

Populations of northern rattlesnake-plantain have been observed to extend up to the boundary of, but not into, recent clearcut and severely burned forest areas in the Sage Creek and Judith River drainages in the Little Belt Mountains (Acuff and Schassberger, 1991; Phillips, 1991). However, populations of this species have been observed surviving in recently logged areas under shelterwood or selection harvest systems . Fire scars on trees in forests with this species testify to the history of less severe underburn type fires that have occurred in these stands in the past (Phillips, 1991).

Forest stands treated by thinning and shelterwood harvest methods in the South Fork Judith area in 1974 were found to have this sensitive plant species in the stands during surveys in 1991. Stands that were clearcut were also surveyed, but no sensitive plants were found within the clearcut boundaries. A seed tree harvest unit in the Bear Park area of the Running Wolf Project Area (stand 460-03-018) was surveyed in 1993 and found to have Northern rattlesnake plantain only in two small undisturbed islands within the harvest unit. The uncut stands around these

clearcuts and seed tree harvest units have abundant Northern rattlesnake plantain populations, which indicates that the harvest units probably did have this sensitive species before treatment.

It is likely that the loss of shade, organic matter and moss during the clearcut, seed tree and dozer piling treatments, changed the micro-climate on the forest floor to such an extent that northern rattlesnake plantain could not survive or reproduce after treatment. It is not known how long it will take for micro-climatic conditions in these stands to once again become suitable for the growth of this species, but all populations known occur in mature forests.

II. GOALS

The overall goal is to maintain viable populations of northern rattlesnake-plantain throughout its geographic range on the Lewis and Clark National Forest (FSM 2670.22). A viable population is defined as "a population that has the estimated numbers and distribution of reproductive individuals to ensure the continued existence of the species throughout its existing range within the planning area (National Forest)". This will be accomplished by providing special management as necessary to allow the continued existence of this species on the Lewis and Clark National Forest, as provided in the Forest Plan (Forest-wide Management Direction N-2). Specific goals include:

1. Maintain metapopulation distributional viability by maintaining the geographic structure of all the populations and their component sub-populations. A metapopulation is defined as "...a collection of interdependent populations affected by recurrent extinctions and linked by recolonizations" (Murphy et al. 1990). The maintenance of many populations is critical for northern rattlesnake-plantain, because it inhabits late forest successional patches in a shifting mosaic of early to late successional forest habitats.

While, in some situations, the loss of individuals may be deemed insignificant, it is important not to lose any entire populations or sub-populations of the species within the metapopulation. The further isolated a population is from its nearest neighboring population, the more important it is to maintain the geographic viability of the metapopulation.

The maintenance of population and sub-population distributional viability should serve as a good stand-in for maintaining less easily observed features that affect the overall viability of the species on the Forest (and R-1), such as genetic varition patterns, pollinator relationships, seed dispersal patterns, and gene flow within and among populations. These factors are important because removal of populations, by either natural or man-caused events, will make dispersal and establishment of new populations a process essential to avoiding species extirpation on the Forest (Shelly 1994; Menges 1990).

2. Designate and maintain large, core populations of northern rattlesnake-plantain within each metapopulation and each sub-drainage within the metapopulation.

For purposes of these interim guidelines, it assumed that the Forest includes four metapopulations: 1) the Judith River drainage consisting of twenty-five occurrences in six sub-drainages; 2) the Musselshell River drainage consisting of six occurrences in three sub-drainages; 3) Dry Fork Belt Creek drainage consisting of one occurrence, and 4) the Big Snowy metapopulation consisting of two occurrences in two sub-drainages.

The distribution of occurrences by size class within each metapopulation is as follows:

	Metapopulation	1-9 Ac.	10-100 Ac.	over 100 Ac.
3	Dry Fork Belt Cr.	0	0	1
1	Judith R.	9	11 pop.	5 pop.
2	Musselshell R.	2	4	0
4	Big Snowy Mtns.	2	0	0

3. Retain suitable but unoccupied habitat of northern rattlesnake-plantain for the colonization and establishment of new populations to support the metapopulation. The selection of old growth stands on northerly aspects on limestone substrate, below 6400 feet elevation, in which the forest floor has a well developed organic/moss layer would best meet this goal. Stands adjacent to occupied northern rattlesnake-plantain occurrences would be the highest priority stands for meeting this goal. This is especially important as existing populations are altered by natural disturbances and management activities.

III. PRESCRIPTIONS

1. For the Maintenance of Metapopulation Distributional Viability

Management activities, such as timber harvest and prescribed fire management, within populations of Northern rattlesnake-plantain will be limited to those that maintain all populations and sub-populations of the species. While individual plants may be removed and habitat altered during management activities, the distribution pattern of all populations and sub-populations will remain intact. Specific practices for timber harvest in occupied habitat of Northern rattlesnake-plantain include:

a. Clearcut, seed tree timber harvest and other patch cutting more than 1/2 acre in size will be avoided on occupied northern rattlesnake plantain micro-habitat, where the opportunity exists for alternative timber harvest within good silvicultural practices for the forest stand.

b. Where clearcutting and/or seed tree timber harvest is the preferred silvicultural prescription, within occupied Northern rattlesnake-plantain habitat, islands of at least five acres in size will be left untreated and distributed on the best occupied habitat within the harvest unit.

c. Where group selection, shelterwood, thinning or other timber harvest treatments consists of patch cuts over 1/2 acre in size within occupied habitat of northern rattlesnake-plantain, this habitat would be identified as a special treatment area. Within this special treatment area, disturbance of the forest floor would be kept to a minimum, by the following actions:

(1) Skid trails within the special treatment area will be avoided whenever possible.

(2) Down woody material (15-20 tons/ac), residual coniferous regeneration and brush cover would be left for microsite shading and nutrient cycling.

(3) Dozer piles would not be placed within the special treatment areas during fuel treatment activities. If excess fuel is located within the special treatment areas, they would be lopped and scattered or hand piled outside of the special treatment area. In areas that

may generate down woody fuels in excess of 20 tons per acre, the use of tree length skidding will be considered, to avoid accumulations that would require dozer piling.

(4) No dozer scarification to expose mineral soil would be applied to the special treatment areas during site preparation activities.

d. Small, isolated populations or sub-populations of northern rattlesnake plantain within harvest units will be marked and protected entirely from damage by logging, skidding, and dozer piling treatments.

2. For the Maintenance of Large Core Areas of Occupied Habitat

The designated core areas are listed below by metapopulation and sub-drainage, and are shown on the maps attached to this report. Within these core populations, habitat integrity will be maintained and fragmentation of occupied habitat will be avoided. These core populations will be maintained and managed in an old growth or late successional forest stage of development favorable to northern rattlesnake-plantain. Fire prescription for these core populations will be immediate suppression. If core populations are eliminated by wildfire, an alternative core population will be selected within the sub-drainage as a replacement, if available.

a. Belt Creek Metapopulation #3

(1) Dry Fork sub-drainage - Blankenship Gulch (2 polygons of EO 036), Mixes Baldy quad., 158 acres.

b. Judith River Metapopulation: #1

(1) Dry Wolf Creek sub-drainage - Tucken Gulch (1 polygon of EO-026), Yogo Peak quad., 5 acres;

(2) Sage Creek sub-drainage - Hay Coulee (EO 006, two polygons), Woodhurst Mountain quad., 171 acres;

(3) Running Wolf sub-drainage - South Fork Running Wolf (EO 008), Bandbox Mountain quad., 349 acres;

(4) Yogo Creek sub-drainage - Bear Gulch (3 polygons of EO 009), Bandbox Mountain quad., 320 acres;

(5) Middle Fork Judith sub-drainage - Lost Fork Judith (4 polygons of EO-004), Ettien Spring quad., 45 acres;

(6) South Fork Judith sub-drainage - Burley Creek (1 polygon of EO-028), Indian Hill and Daisy Peak quads., 62 acres;

c. Musselshell River Metapopulation #2

(1) East Fork Haymaker Creek sub-drainage - Haymaker Narrows (EO-020, 2 polygons), Haymaker Narrows quad., 39 acres;

(2) West Fork Hopley Creek sub-drainage - W. Fork Hopley Cr.(EO-018), Jellison Place and Haymaker Narrows quad., 94 acres;

(3) East Fork Hopley Creek sub-drainage - E. Fk. Hopley Cr. (EO 019), Jellison Place quad., 70 acres;

d. Big Snowy Metapopulation ±1 d

(1) Big Spring Creek sub-drainage - Half Moon Creek (EO 005), Half Moon Canyon quad., 4 acres.

(2) Rock Creek sub-drainage - Crystal Cascades (EO 023), Jumpup Peak quad., 1 acre Total 13

3. For the retention of suitable but unoccupied habitat of Northern rattlesnake-plantain for the establishment of new populations to support the metapopulation.

a. Consider habitat requirements of Northern rattlesnake-plantain in designating old growth forest inventory, rating and designation. By retaining suitable, but unoccupied habitat for the species, within designated old growth forest near occupied habitat, there will be opportunity for seed dispersal and establishment. This will allow for metapopulation viability over time, as the landscape mosaic shifts.

IV. REFERENCE LIST

Achuff, Peter. 1992. Status Review Update of *Goodyera repens*. Montana Natural Heritage Program Contract Report. 38 pages.

Achuff, Peter and L.Schassberger. 1991. Status Review of *Goodyera repens*. Montana Natural Heritage Program Contract Report. 52 pages.

Menges, E.S. 1990. Population Viability Analysis for an Endangered Plant. Conservation Biology 4: 52-62.

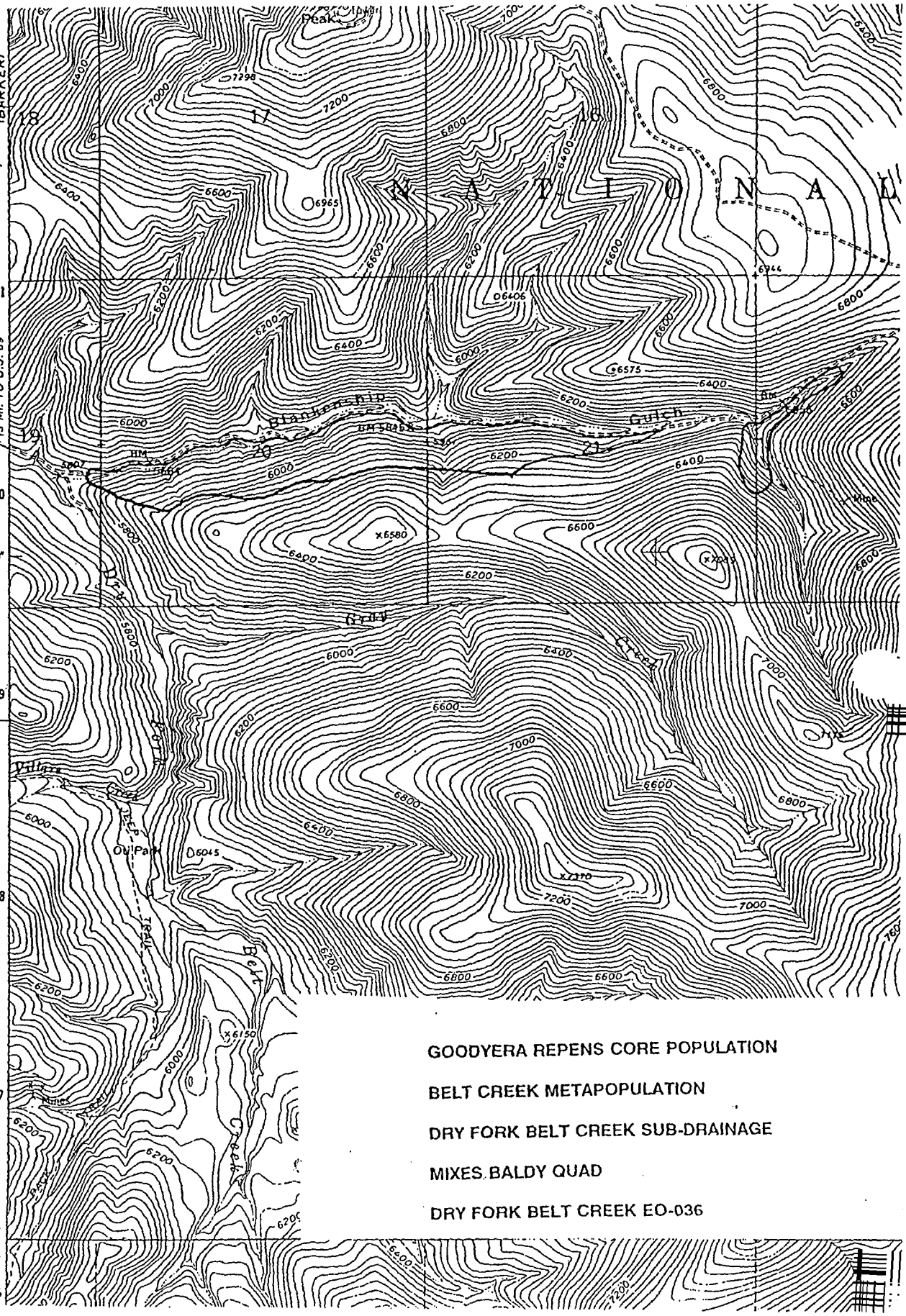
Murphy, D.D., K.E. Freas, and S.B. Weiss. 1990. An Environment-Metapopulation Approach to Population Viability Analysis for a Threatened Invertebrate. Conservation Biology 4: 41-51.

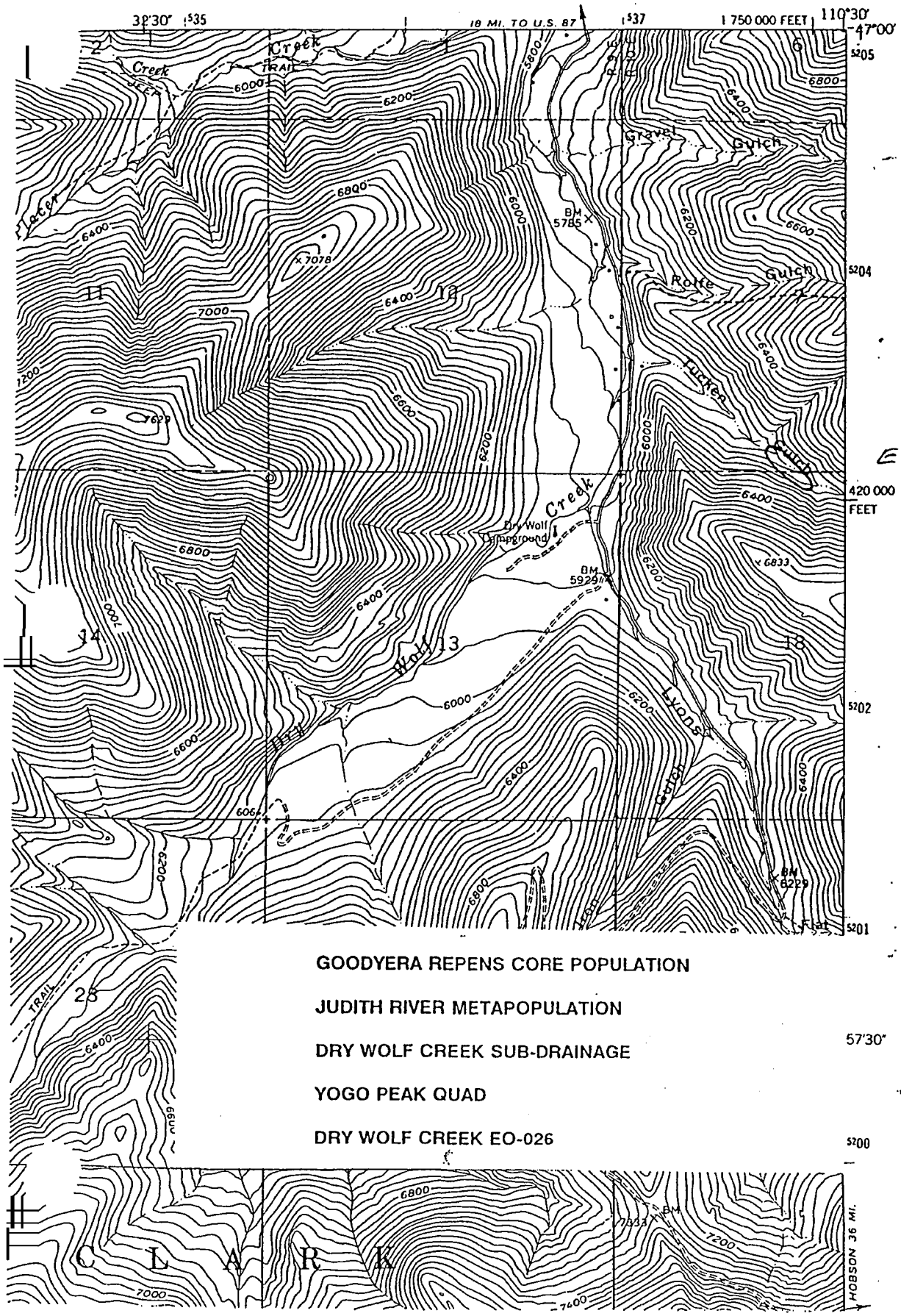
Pavek, D.S. and L.A. Schassberger. 1991. Status Review of *Agoseris lackschewitzii*. Montana Natural Heritage Program Contract Report. 52 pages.

Shelly, Steve. 1994. Population Viability Assessments for TES Plants (Draft).

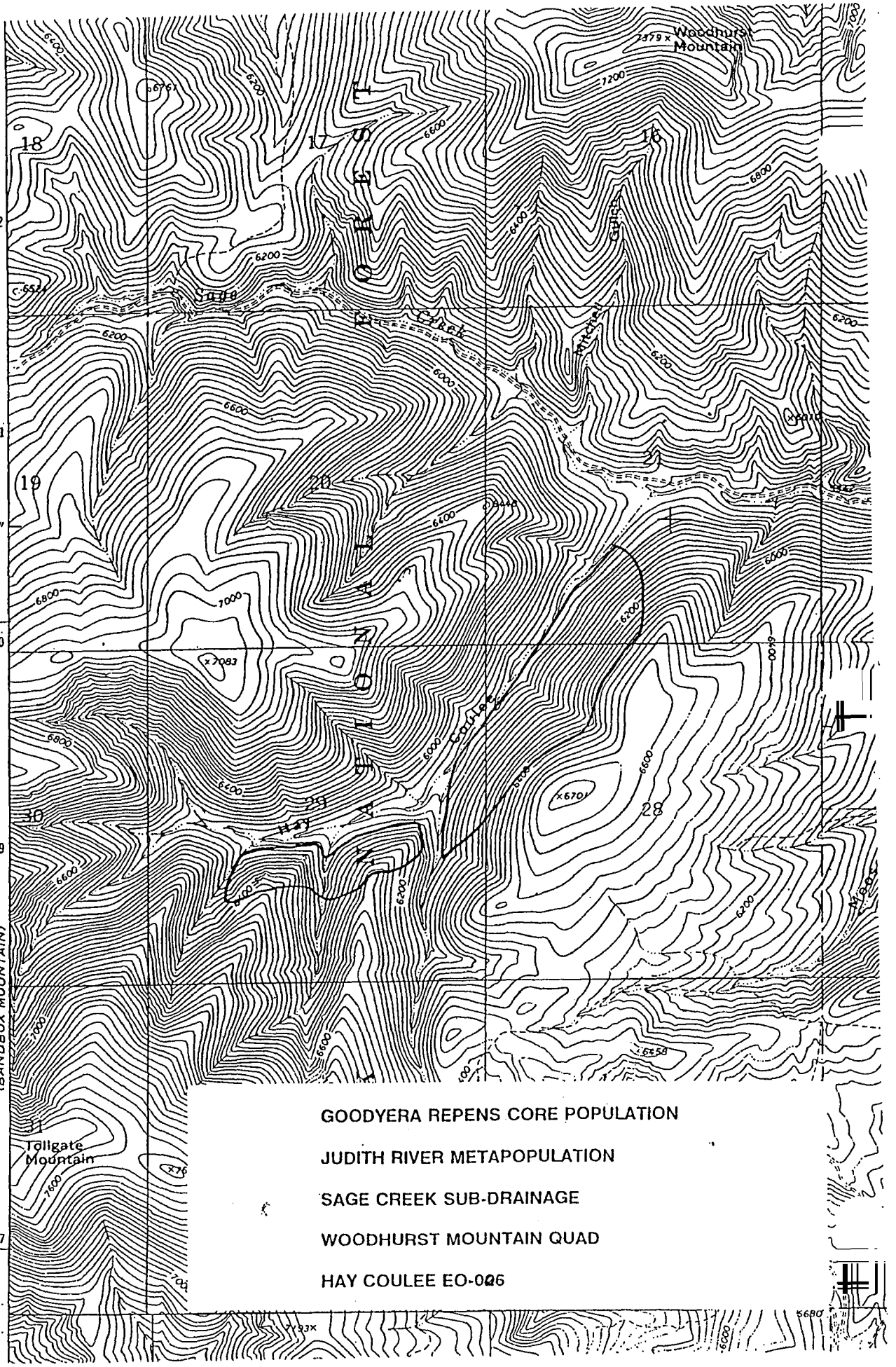
V. MAPS OF CORE AREAS

Attached

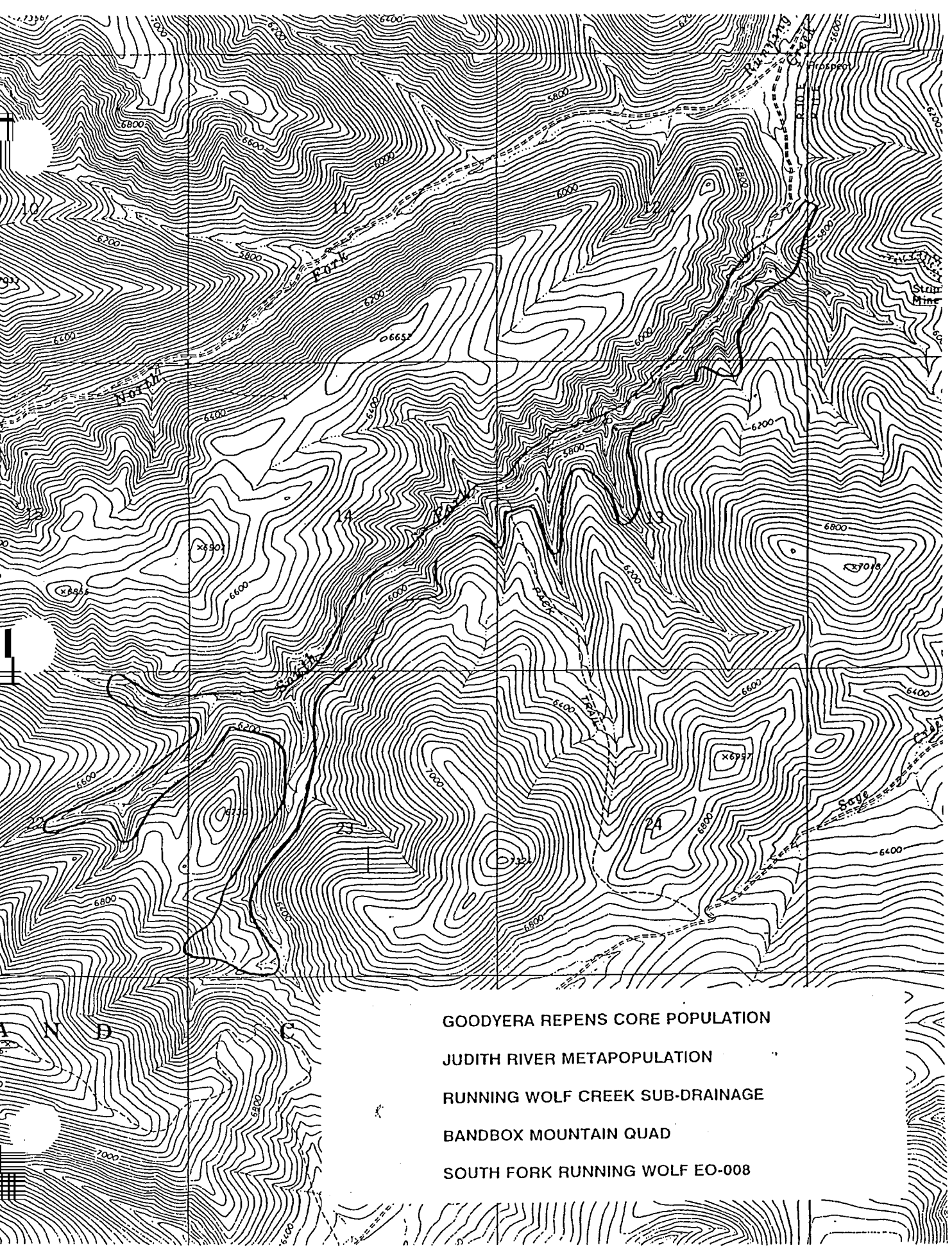

GOODYERA REPENS CORE POPULATION
BELT CREEK METAPOPULATION
DRY FORK BELT CREEK SUB-DRAINAGE
MIXES BALDY QUAD
DRY FORK BELT CREEK EO-036


YOGO PEAK QUADRANGLE
MONTANA-JUDITH BASIN CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
3978 III SW
(WOLF BUTTE)
18 MI. TO U.S. 87
1 750 000 FEET
110°30'
47°00'
38°30'
57'30"
420 000 FEET
Gravel Gulch
Rolfe Gulch
Fuchen Gulch
Dry Wolf Creek
Dry Wolf Campground
Lyons Gulch
Flat
BM 5785
BM 5929
BM 6229
BM 7233
TRAIL
CLARK
HOBSON 36 MI.
GOODYERA REPENS CORE POPULATION
JUDITH RIVER METAPOPULATION
DRY WOLF CREEK SUB-DRAINAGE
YOGO PEAK QUAD
DRY WOLF CREEK EO-026

EO-026


Woodhurst Mountain
7379
Sage Creek
Hay Coulee
Tollgate Mountain
7793
5202
5201
5200
5199
5197
57'30"
T. 14 N.
T. 13 N.
3977 IV NW
(SANDBOX MOUNTAIN)
GOODYERA REPENS CORE POPULATION
JUDITH RIVER METAPOPULATION
SAGE CREEK SUB-DRAINAGE
WOODHURST MOUNTAIN QUAD
HAY COULEE EO-006

EO-006



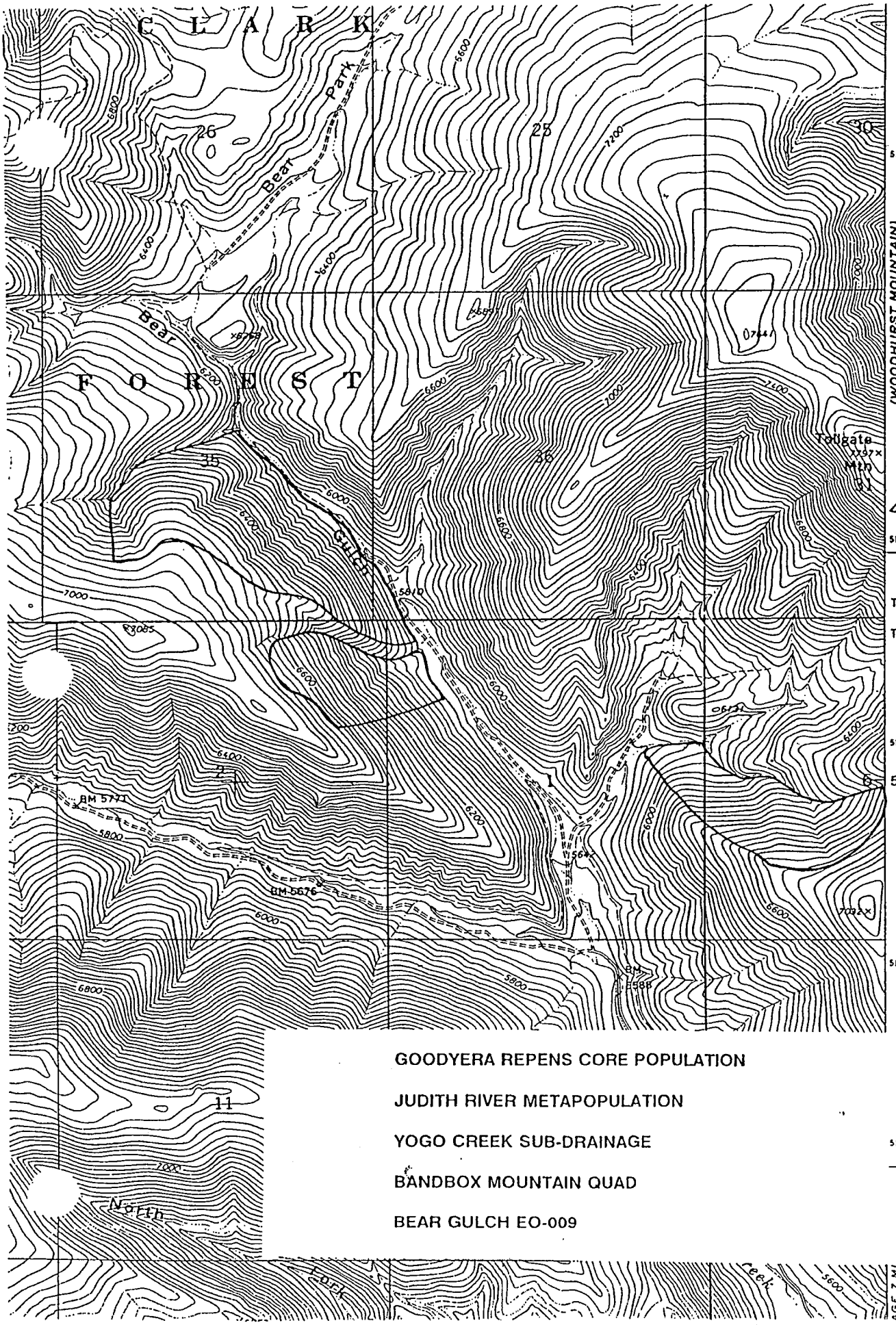
GOODYERA REPENS CORE POPULATION

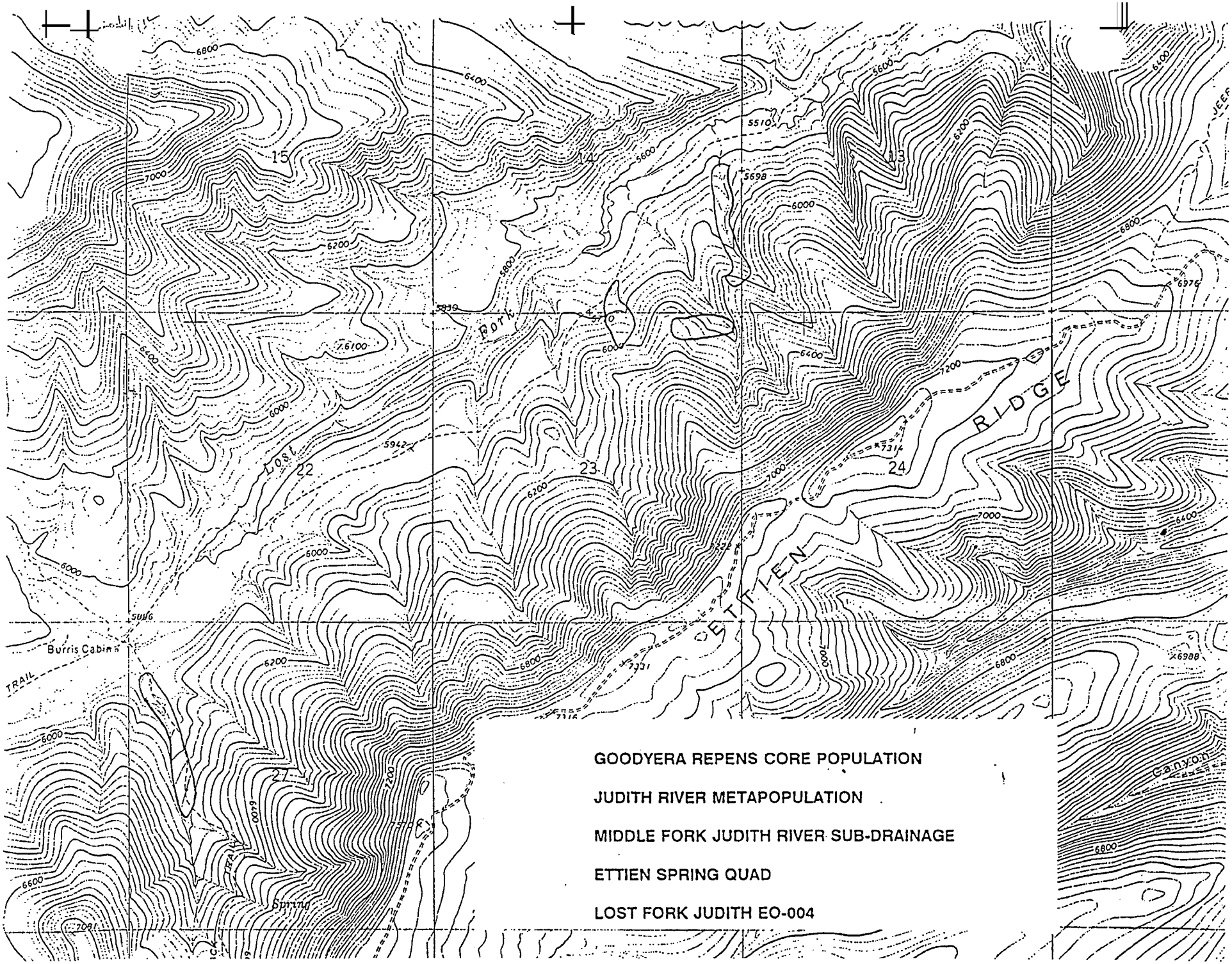
JUDITH RIVER METAPOPULATION

RUNNING WOLF CREEK SUB-DRAINAGE

BANDBOX MOUNTAIN QUAD

SOUTH FORK RUNNING WOLF EO-008


C L A R K
F O R E S T
Bear Park
Bear Gulch
Tollgate Mtn
(WOODHURST MOUNTAIN) 3977 IV NE
EO-009
T. 14 N.
T. 13 N.
BM 5797
BM 5676
BM 5588
North Fork
Creek
GOODYERA REPENS CORE POPULATION
JUDITH RIVER METAPOPULATION
YOGO CREEK SUB-DRAINAGE
BANDBOX MOUNTAIN QUAD
BEAR GULCH EO-009


GOODYERA REPENS CORE POPULATION
JUDITH RIVER METAPOPULATION
MIDDLE FORK JUDITH RIVER SUB-DRAINAGE
ETTIEN SPRING QUAD
LOST FORK JUDITH EO-004
Lost Fork
Ettien Ridge
Burris Cabin
Trail
Spring
Canyon
15
14
13
22
23
24
2
11
6800
6400
6600
6200
6000
5800
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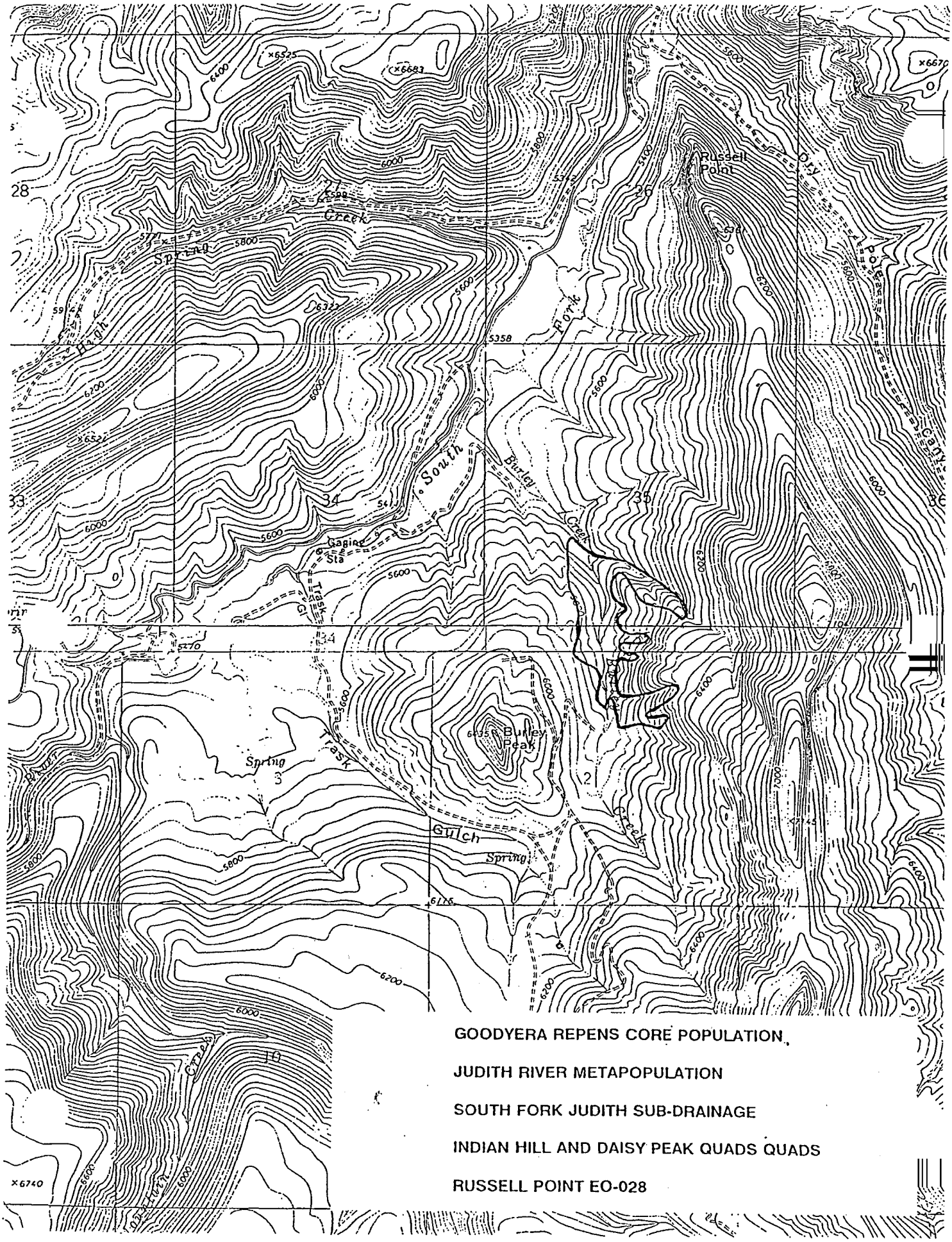
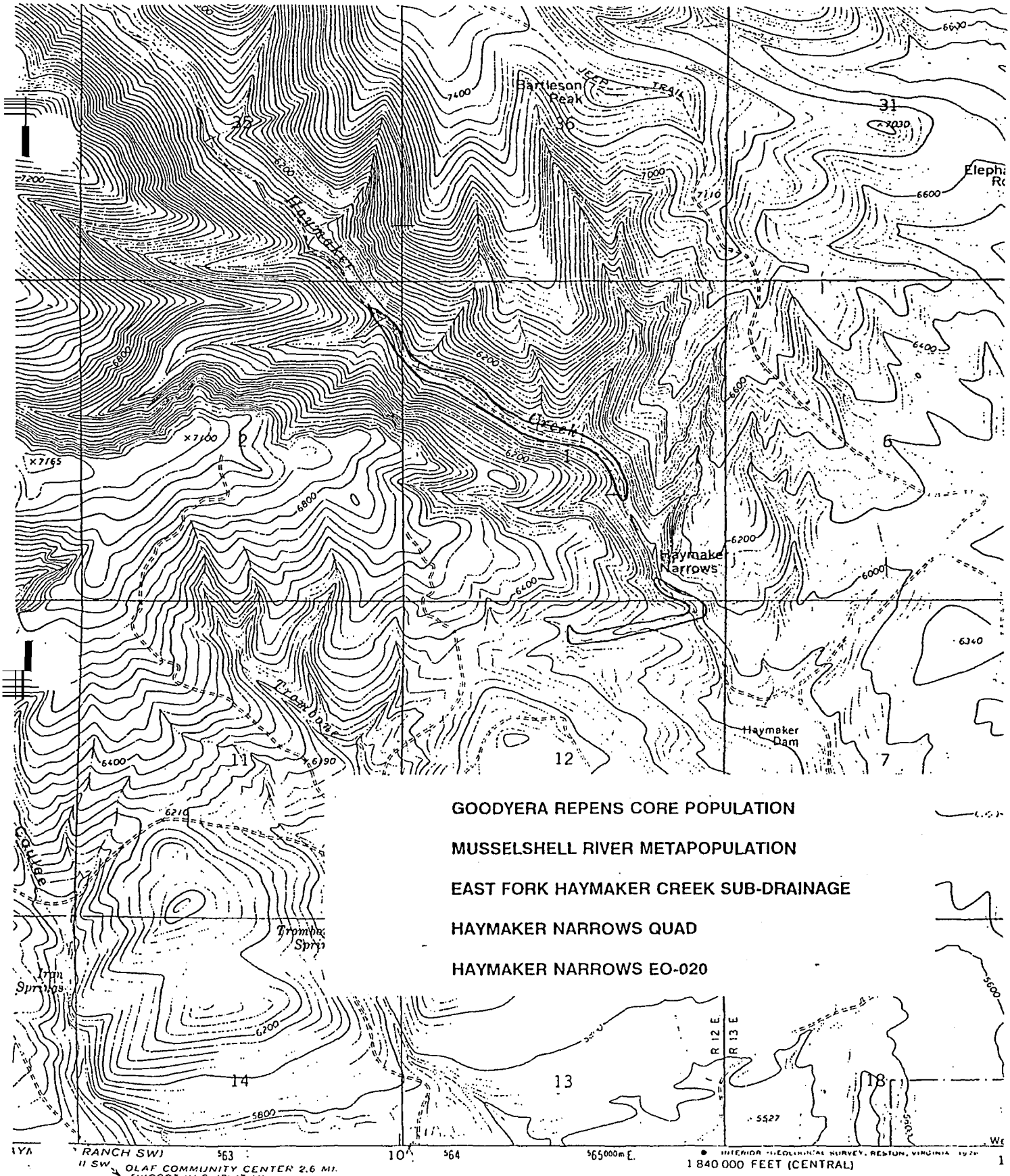
7331
6988
5996
7091


Russell Point
Burley Peak
Trask Gulch
Spring
Creek
South Fork
Gaging Sta
Trail
Power
Canyon
Dry
Pole
Burley
Trask
Creek
Gulch
Spring
Fork
Creek
Canyon
Creek
Creek
Creek



GOODYERA REPENS CORE POPULATION

MUSSELSHELL RIVER METAPOPULATION

EAST FORK HAYMAKER CREEK SUB-DRAINAGE

HAYMAKER NARROWS QUAD

HAYMAKER NARROWS EO-020

RANCH SW) 563 10 564 565000m E.

11 SW OLAF COMMUNITY CENTER 2.6 MI.
TWODOT (U.S. 12) 17 MI.

INTERIOR-GEOLOGICAL SURVEY, RESTON, VIRGINIA

1 840 000 FEET (CENTRAL)

CALE 1:24 000

0 1 MILE

3000 4000 5000 6000 7000 FEET

0 1 KILOMETRE

OUR INTERVAL 40 FEET

ROAD CLASSIFICATION

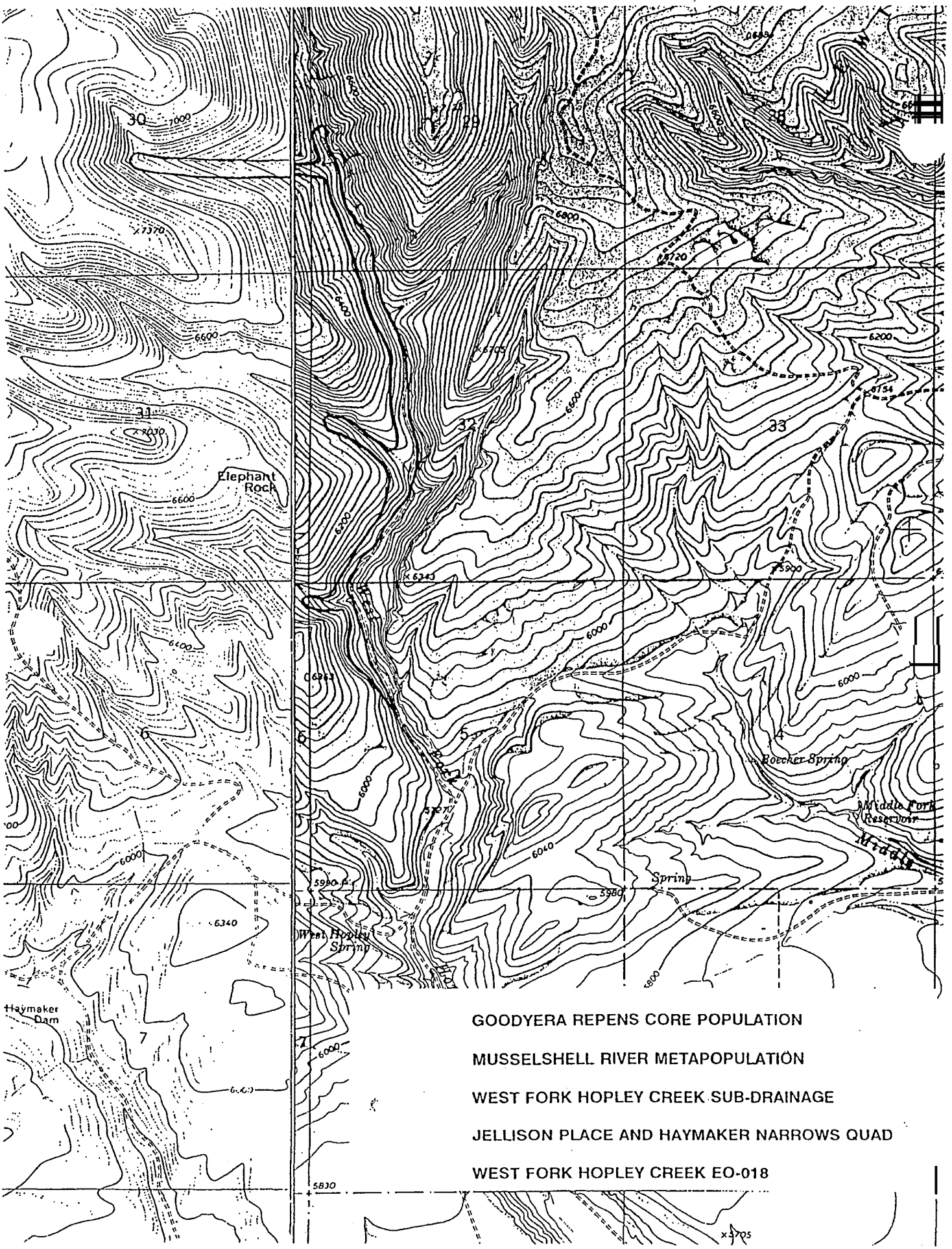
Primary highway, hard surface

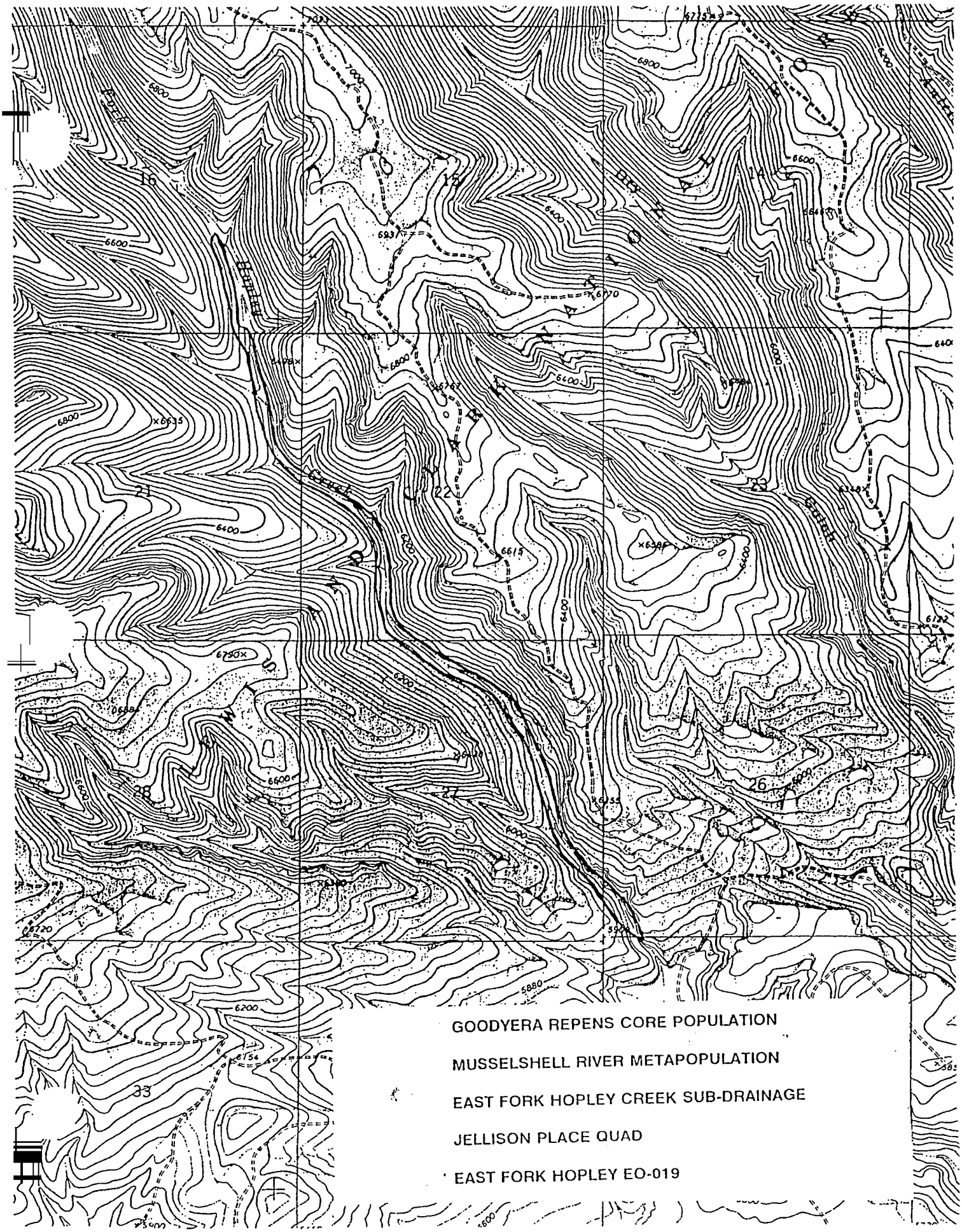
Secondary highway, hard surface

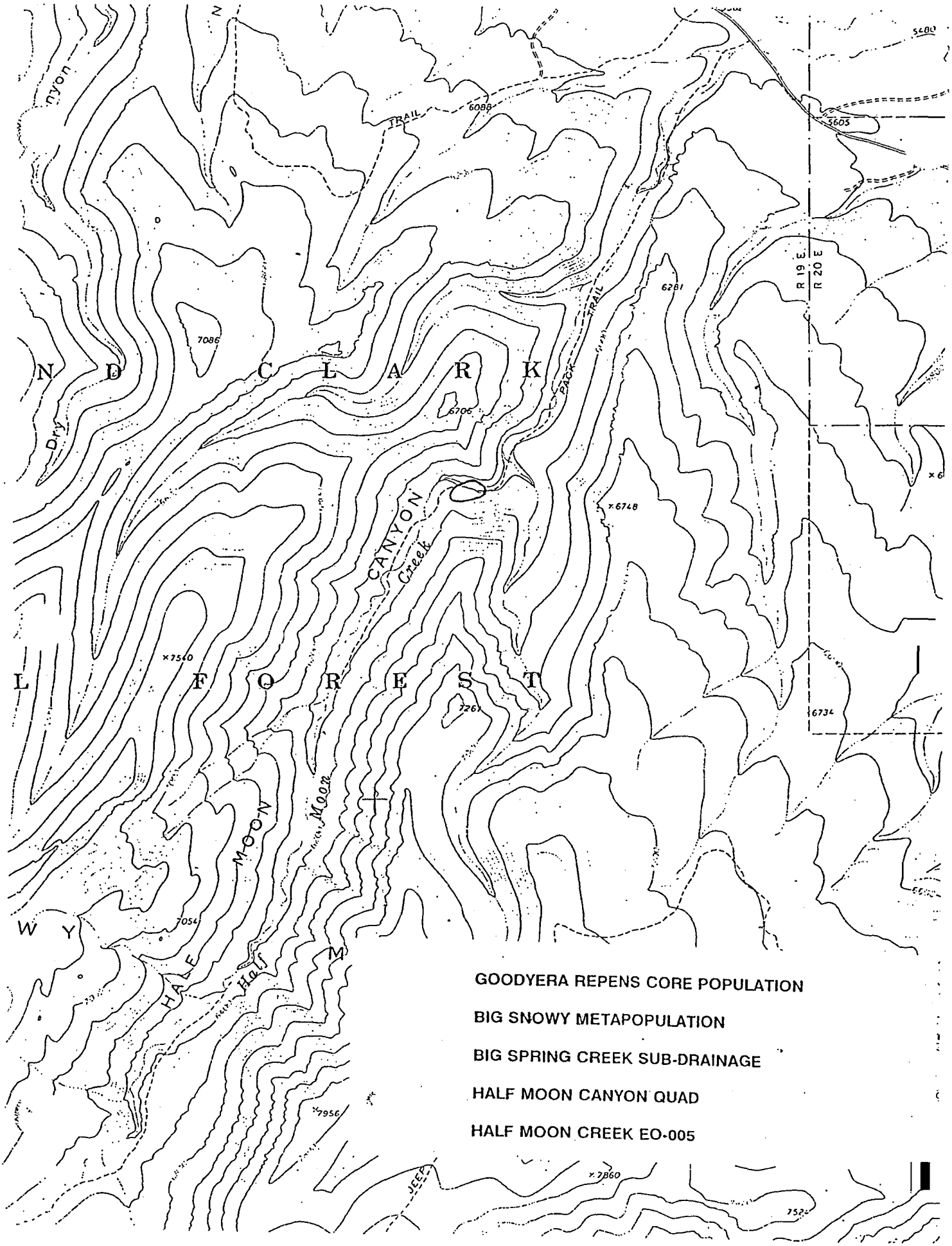
Light-duty road, hard or improved surface

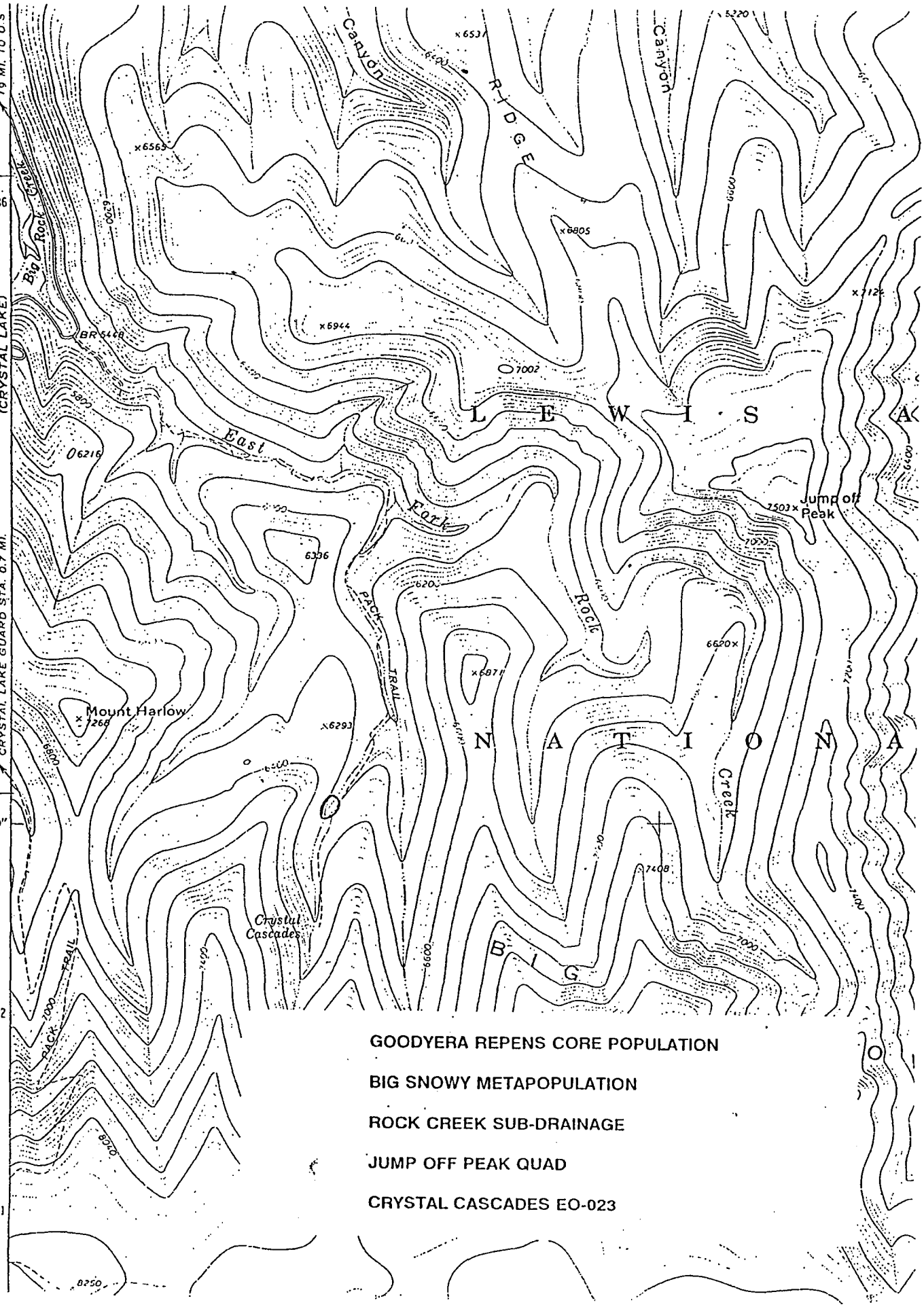
Unimproved road

Interstate Route U.S. Route State Rou


Elephant Rock
Haymaker Dam
West Hopley Spring
Roecker Spring
Middle Fork Reservoir
Spring
GOODYERA REPENS CORE POPULATION
MUSSELSHELL RIVER METAPOPULATION
WEST FORK HOPLEY CREEK SUB-DRAINAGE
JELLISON PLACE AND HAYMAKER NARROWS QUAD
WEST FORK HOPLEY CREEK EO-018


GOODYERA REPENS CORE POPULATION
MUSSELSHELL RIVER METAPOPULATION
EAST FORK HOPLEY CREEK SUB-DRAINAGE
JELLISON PLACE QUAD
EAST FORK HOPLEY EO-019


N
TRAIL
6088
5605
R 19 E
R 20 E
6281
7086
N D C L A R K
6706
PACK TRAIL
Dry
CANYON
Creek
×6748
×7560
L F O R E S T
7261
6734
Half Moon
HALF MOON
7054
W Y
7956
JEEP
×7860
7520
GOODYERA REPENS CORE POPULATION
BIG SNOWY METAPOPULATION
BIG SPRING CREEK SUB-DRAINAGE
HALF MOON CANYON QUAD
HALF MOON CREEK EO-005



EO
023

GOODYERA REPENS CORE POPULATION

BIG SNOWY METAPOPULATION

ROCK CREEK SUB-DRAINAGE

JUMP OFF PEAK QUAD

CRYSTAL CASCADES EO-023